

Newton's Laws

Example

$$g = 9.8 \text{ m/s}^2$$

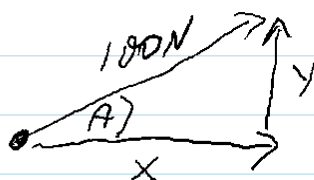
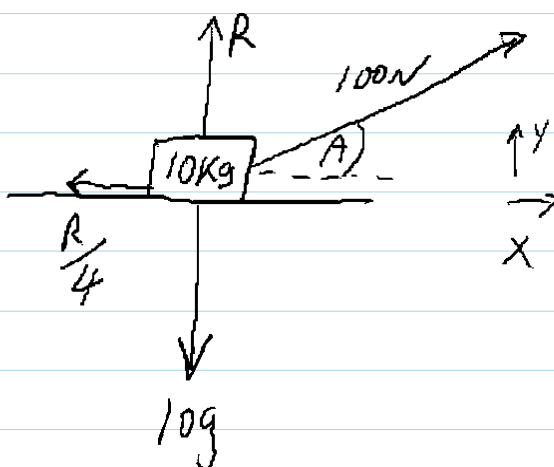
VERT

UP = DOWN

$$R + 60 = 10g$$

$$R + 60 = 98$$

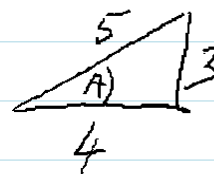
$$\boxed{R = 38 \text{ N}}$$



$$\cos A = \frac{x}{100} \quad x = 100 \cos A = 100 \left(\frac{4}{5} \right) = 80 \text{ N}$$

$$\sin A = \frac{y}{100} \quad y = 100 \sin A = 100 \left(\frac{3}{5} \right) = 60 \text{ N}$$

GIVEN



$$F = MR$$

$$M = \frac{1}{4}$$

$$F = \frac{R}{4}$$

HORIZ

$$F = ma$$

$$80 - \frac{R}{4} = 10a$$

$$80 - \frac{38}{4} = 10a$$

$$80 - 9.5 = 10a$$

$$70.5 = 10a$$

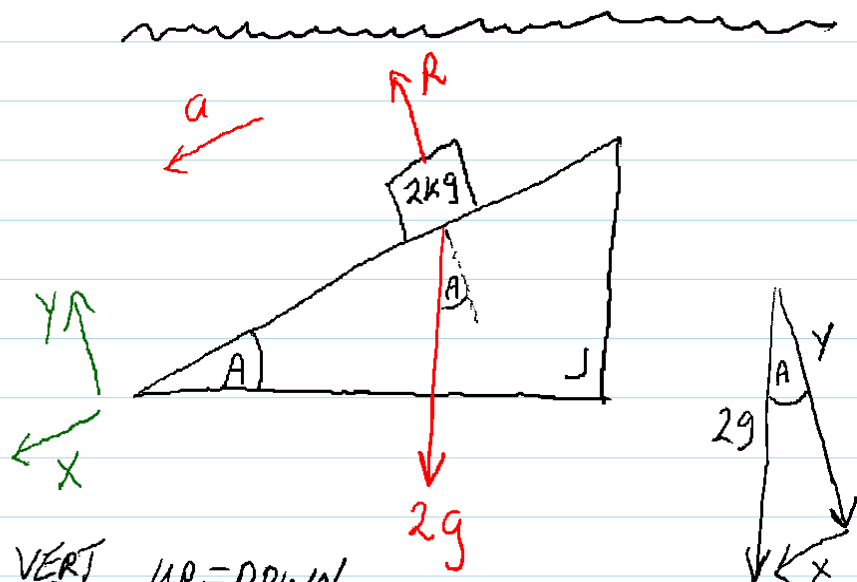
$$a = 7 \text{ m/s}^2$$

Q) PARTICLE $m = 2 \text{ kg}$

SLIPS DOWN A SLOPE - ANGLE A -

$$\sin A = \frac{1}{5}$$

FIND ACC. AND REACTION FORCE



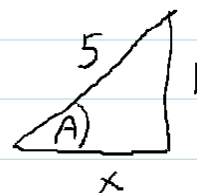
VERT UP = DOWN

$$R = 2g \cos A$$

$$R = 2g \left(\frac{2\sqrt{6}}{5} \right) = \frac{49\sqrt{6}}{5}$$

$$\cos A = \frac{y}{2g} \quad y = 2g \cos A$$

$$\sin A = \frac{x}{2g} \quad x = 2g \sin A$$



Pythag: $x^2 + 1^2 = 5^2$

$$x^2 + 1 = 25$$

$$x^2 = 24$$

$$x = \sqrt{24}$$

$$= \sqrt{6 \cdot 4}$$

$$= 2\sqrt{6}$$

$$\begin{aligned} \cos A &= \frac{x}{5} \\ &= \frac{2\sqrt{6}}{5} \end{aligned}$$

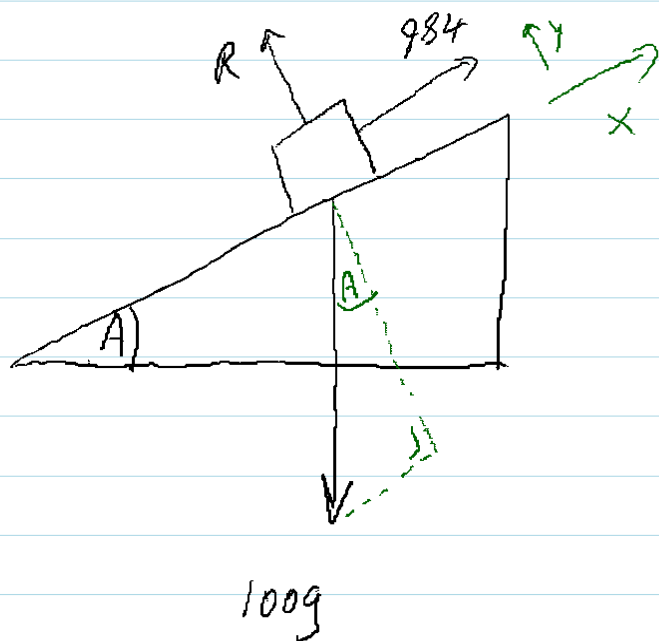
Horiz $F = ma$

$$mg \sin A = ma$$

$$g \left(\frac{4}{5}\right) = a$$

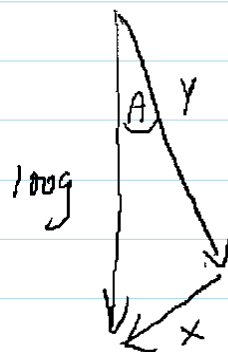
$$a = \frac{9}{5} \text{ m/s}^2$$

Q.) A BLOCK OF MASS 100 kg IS DRAGGED UP A SMOOTH SLOPE WHICH MAKES AN ANGLE A WITH THE HORIZ WHERE $\tan A = \frac{4}{3}$. IF THE PULLING FORCE ALONG THE PLANE IS 984 N, FIND ACCELERATION. IF SLOPE IS ROUGH AND $\mu = \frac{1}{3}$, FIND THE NEW ACC.



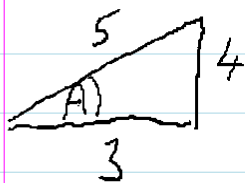
$$\cos A = \frac{y}{100g}$$

$$y = 100g \cos A$$



$$\sin A = \frac{x}{100g}$$

$$x = 100g \sin A$$



$$\sin A = \frac{4}{5}$$

$$\cos A = \frac{3}{5}$$

